

## 6-12 MATHEMATICS INSTRUCTIONAL MODELS

### LEARNER-CENTERED MODEL

**OVERVIEW:** This model focuses on student voice, choice, flexibility, as well as deeper approaches to learning such as inquiry, engineering design process, project-based learning, and design thinking. Students may focus on processing moods, emotions, feelings, and current events using physical activity and creative thinking.

#### TEACHER PLANNING GUIDANCE

Teachers will provide guidance to students as they work through a problem or task related to the application of the essential knowledge and skills students need to learn.

Prior to selecting problems and tasks, teachers should identify the specific required content that has not been taught and develop learning opportunities to address the missing content. Teachers may utilize the [Oregon Mathematics Standards](#) and district curriculum guides to assist with determining which standards students have had sufficient exposure and experience with prior to a school closure.

#### SUGGESTED STRATEGIES

The learner-centered pathway allows for higher levels of inquiry and student autonomy as they build conceptual understanding and work individually and/or collaboratively to complete problems and task. Students may need guidance on project planning and guidance on time and task allocation.

Incorporate different asynchronous, synchronous learning, and non-tech based learning support.

- [Distance Learning for All: Care, Connection, Continuity](#) (Offers guidance and requirements)
- Create a network of support for students that allows differentiation and meets their learning needs (Teacher, peers, and other educators) [ODE Special Education](#), [ODE TAG](#), [ODE English Learners \(page 18\)](#)
- Identify strengths/areas of growth to inform the selection of ancillary materials.
- Encourage students to create a timeline for the project, so they can divide the workload as they see fit.
- Hold teacher office hours that provide an opportunity to address individual student questions and give extra support - may include virtual learning platforms, telephone calls, and email
- Provide consistent and timely feedback to students and provide opportunities for them to work collaboratively through the use of tools such as:
  - Video Conferencing ([Google Meet](#), [Zoom](#), etc.)
  - Telephone calls and email
  - Collaborative platforms (Google, [Padlet](#), [Flipgrid](#), etc.)
- Ancillary materials should be provided by the teacher to support student learning. These may include:

#### SAMPLE WEEKLY SCHEDULE

(Maximum mathematics instruction is 2.5 hours/week.)

Learning time is 30 minutes daily. Note that projects may span multiple weeks.

Note: Daily and weekly schedule times and activities are recommendations; however, teachers, students, and families should work together to adapt schedules and activities to meet individual needs.

#### **Monday:**

- Students are introduced to the learning goals and essential knowledge and skills for the targeted standards/content.
- Students are provided (either synchronously or asynchronously) options, parameters, and performance expectations of the project/task.
- Students begin to review ancillary materials (rubrics, videos, content support, etc.) that are either suggested by the teacher or sought out on their own to support completion of the task/project.

#### **Tuesday:**

- Students (individually or collaboratively)
  - Begin research to explore the project/task.
  - Create a plan to complete the project/task utilizing ancillary resources as needed

#### **Wednesday:**

- Students consult with teacher to review project/task plan and receive feedback.

#### **Thursday:**

- Students (individually or collaboratively) work on completing project/task.

#### **Friday:**

- Students (or teams of students) complete a reflection on their learning to be reviewed by the

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<ul style="list-style-type: none"> <li>○ Videos, example problems, or practice items</li> <li>○ Teacher-created learning materials</li> <li>○ Textbook resources - online or hardcover</li> <li>● Teachers should continuously monitor students/collaborative groups to observe and address misconceptions that might arise</li> <li>● Support continuous skill-building opportunities through online sites such as <a href="#">Khan Academy</a> or other resources</li> </ul>	<p>teacher.</p> <ul style="list-style-type: none"> <li>○ Reflections should ask students to think about successes, challenges, and questions they still might have</li> <li>○ Students and teacher collaboratively discuss the various project/tasks completed and compare problem-solving strategies and representations, justify thinking, and identify common errors and misconceptions</li> </ul>
<p><b>RESOURCES</b></p> <ul style="list-style-type: none"> <li>● <a href="#">6-8 Online Resources</a> – Oregon Open Learning</li> <li>● <a href="#">9-12 Online Resources</a> – Oregon Open Learning</li> <li>● <a href="#">Oregon Open Learning</a> - additional resources</li> <li>● <a href="#">VDOE Mathematical Tasks</a> - collection of tasks that teachers may choose to use with students</li> <li>● <a href="#">Robert Kaplinsky</a> - includes a variety of <a href="#">lesson ideas</a>, <a href="#">problem-based resources</a>, and links to <a href="#">Open Middle</a> math problems</li> <li>● <a href="#">TED Talks - Video Playlists about Math</a> - talks from experts around the world to promote student interest and provide project ideas</li> <li>● <a href="#">An Inquiry-Based Approach: Project-Based Learning - NCTM</a> - a useful article for educators beginning to implement project-based learning in mathematics; includes project planning templates and other documents for teachers and students to use</li> <li>● <a href="#">MARS - Mathematics Assessment Project</a> - site includes <a href="#">tasks</a>, <a href="#">professional learning modules</a>, and <a href="#">tools</a> to aid deep understanding</li> </ul>	<p>**The teacher begins the next week debriefing and giving feedback to students/teams based on reflections.</p> <p>This process would continue until the conclusion of the project. Projects may span multiple weeks.</p> <p>**Throughout the week students should participate in continuous skill-building. These are opportunities for students to practice skills that continue to develop fluency and make connections to new content.</p>

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### TEACHER-CENTERED MODEL

**OVERVIEW:** This model is used to teach specifically to the standards. Instruction takes the form of direct instruction, then demonstration of skills or concepts in a mode directed by the teacher. Skills and concepts covered using this model could then be used flexibly in a student-centered approach.

#### TEACHER PLANNING GUIDANCE

Teachers should focus on identifying the essential knowledge and skills students will learn each week and curate and design appropriate instructional resources for student use.

Prior to establishing weekly learning goals, teachers should identify the specific required content that has not been taught and develop learning modules to address the missing content. Teachers may utilize the [Oregon Mathematics Standards](#) and district curriculum guides to assist with determining which standards students have had sufficient exposure and experience with prior to a school closure and to make decisions regarding when and how experience with new standards might occur moving forward.

#### SUGGESTED STRATEGIES

The teacher-centered pathway uses confirmation and structured inquiry as students apply content to assigned coursework. The role of the teacher in this pathway is to provide direct support for students to explore problems, task, and mathematical processes. Students create work products that are shared largely between themselves and their respective teachers.

- [Distance Learning for All: Care, Connection, Continuity](#) (Offers guidance and requirements)
- Create a network of support for students that allows differentiation and meets their learning needs (Teacher, peers, and other educators) [ODE Special Education](#), [ODE TAG](#), [ODE English Learners \(page 18\)](#)
- Identify strengths/areas of growth to inform the selection of ancillary materials.
- Provide consistent weekly communication - may include written (email, Google Doc), video, or telephone communication
- Hold teacher office hours that provide an opportunity to address individual student questions and give extra support - may include virtual learning platforms, telephone calls, and email
- Establish weekly goals - may include “I can” statements with descriptions of learning outcomes
- Incorporate teacher-created video lessons
- Include access to learning experiences and tasks. These may be paper documents or electronic versions. Sources may include:
  - Teacher created - online or paper

#### SAMPLE WEEKLY SCHEDULE

(Maximum mathematics instruction is 2.5 hours/week.)

Learning time is 30 minutes daily. Note that projects may span multiple weeks.

Note: Daily and weekly schedule times and activities are recommendations; however, teachers, students, and families should work together to adapt schedules and activities to meet individual needs.

#### **Monday:**

- Students are introduced to the learning goals and essential knowledge and skills for the specific standards/content
- Students engage in an introductory problem or hook associated with the content

#### **Tuesday:**

- Students review lessons assigned by the teacher which may include synchronous or asynchronous virtual lessons or other mediums for learning
- Students select from a teacher-created choice of content learning experiences and tasks
- Students engage in learning through a choice of virtual resources, [virtual manipulatives](#), and games suggested by the teacher to make connections to the targeted content

#### **Wednesday:**

- Students complete targeted content practice which may include:
  - [Desmos](#) self-checking activities
  - [CK-12](#) - online textbook, adaptive practice, and video examples
  - [Wizer.me](#) - interactive and engaging online activities
  - [Mathigon](#) - online lessons for mathematics

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<ul style="list-style-type: none"> <li>○ Textbooks - online or hard copies</li> <li>○ Vendor Resources - online or paper</li> <li>○ <a href="#">Desmos</a> Activities - online</li> <li>○ Other Resources - online or paper</li> <li>● Provide consistent and timely feedback to students through:             <ul style="list-style-type: none"> <li>○ Video Conferencing (<a href="#">Google Meet</a>, <a href="#">Zoom</a>)</li> <li>○ Telephone calls and email</li> <li>○ Collaborative platforms (Google, <a href="#">Padlet</a>, <a href="#">Flipgrid</a>, Discussion Board, etc.)</li> <li>○ Shared Google documents of common questions and teacher responses</li> <li>○ <a href="#">Desmos</a> self-checking activities</li> <li>○ Answer keys and worked out solutions</li> </ul> </li> <li>● Support continuous skill-building opportunities through online sites such as <a href="#">Khan Academy</a> or other resources</li> </ul>	<p>topics grades 6 - 12</p> <ul style="list-style-type: none"> <li>○ <a href="#">Geogebra</a> - a dynamic mathematics software for geometry, algebra, graphing, statistics and calculus</li> <li>○ Teacher created problems and activities (virtual and paper versions)</li> <li>● Students attend office hours to receive content clarification, feedback, and support</li> </ul> <p><b>Thursday:</b></p> <ul style="list-style-type: none"> <li>● Students complete a <a href="#">learning log</a> to reflect on learning and identify additional support needed</li> <li>● Students review feedback provided by the teacher including common errors, student misconceptions, multiple representations and participates in remediation</li> </ul>
<p><b>RESOURCES</b></p> <ul style="list-style-type: none"> <li>● <a href="#">6-8 Online Resources</a> – Oregon Open Learning</li> <li>● <a href="#">9-12 Online Resources</a> – Oregon Open Learning</li> <li>● <a href="#">Oregon Open Learning</a> - additional resources</li> <li>● <a href="#">Illustrative Mathematics</a>- problem-based core curricula and professional learning resources that help teachers and students excel in teaching and learning mathematics</li> </ul> <p><a href="#">Desmos Classroom Activities</a> - activities to facilitate student exploration and practice. The teacher dashboard collects and organizes student responses. Teachers can now provide <a href="#">written feedback</a>. There are premade activities grouped as <a href="#">distance friendly collections</a>, and there is a <a href="#">starter screen collection</a> to help check in with students. Additional <a href="#">Desmos COVID-19</a> resources are available.</p>	<p><b>Friday:</b></p> <ul style="list-style-type: none"> <li>● Students complete a formative assessment to demonstrate acquisition of knowledge and skills</li> <li>● Students may complete an extension activity to make connections between concepts and real-world applications</li> <li>● **Throughout the week students should participate in continuous skill building. These are opportunities for students to practice skills that continue to develop fluency and make connections to new content.</li> </ul>

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### HYBRID MODEL

**OVERVIEW:** This model is a happy medium between the two approaches above. Instruction in this pathway may take the form of menus, activity calendars, and more in order to offer choices and options for students and families based on student interest and available resources.

#### TEACHER PLANNING GUIDANCE

Teachers will provide guidance to students as they work collaboratively through a problem or task related to the application of essential knowledge and skills.

Prior to curating and designing instructional resources, teachers should identify the specific required content that has not been taught and develop learning modules to address the missing content. Teachers may utilize the [Oregon Mathematics Standards](#) and district curriculum guides to assist with determining which standards students have had sufficient exposure and experience with prior to a school closure and to make decisions regarding when and how experience with new standards might occur moving forward.

#### SUGGESTED STRATEGIES

The hybrid pathway allows for a balance between student and teacher-centered learning approaches of instruction and employs different levels of inquiry as appropriate. This pathway provides a foundation of support provided by the teacher with opportunities for students to explore problems and task completion of individual and/or group projects and challenges. Students may need guidance on project planning and guidance on timelines and task allocation.

- [Distance Learning for All: Care, Connection, Continuity](#) (Offers guidance and requirements)
- Create a network of support for students that allows differentiation and meets their learning needs (Teacher, peers, and other educators) [ODE Special Education, ODE TAG, ODE English Learners \(page 18\)](#)
- Identify student strengths/areas of growth to inform the selection of ancillary materials.
- Include a rubric when introducing a task, if possible
- Provide consistent weekly communication - may include written (email, Google Doc), video, or telephone communication
- Hold teacher office hours that provide an opportunity to address individual student questions and give extra support - may include virtual learning platforms, telephone calls, and email
- Establish weekly goals - may include "I can" statements with descriptions of learning outcomes
- Incorporate teacher-created video lessons
- Provide access and choice to varied learning experiences and tasks
- Provide timely student feedback to students through:

#### SAMPLE WEEKLY AGENDA

(Maximum mathematics instruction is 2.5 hours/week.)

Learning time is 30 minutes daily. Note that projects may span multiple weeks.

Note: Daily and weekly schedule times and activities are recommendations; however, teachers, students, and families should work together to adapt schedules and activities to meet individual needs.

##### **Monday:**

- Students are introduced to the learning goals and essential knowledge and skills for the targeted standards/content
- Students collaborate with peers to engage in exploring a task/discovery activity/hook associated with the content

##### **Tuesday:**

- Students review lessons provided by the teacher which may include synchronous or asynchronous virtual lessons
- Students identify additional skills needed to solve an assigned task or master a skill
- Students select from a choice of learning experiences and tasks targeting the content (online or paper activities and resources provided by the teacher)

##### **Wednesday:**

- Students collaborate with peers to share possible strategies to address the selected task
- Students complete targeted learning experiences, tasks, and content practice which may include:
  - Teacher created resources - online or

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<ul style="list-style-type: none"> <li>○ Video Conferencing (<a href="#">Google Meet</a>, <a href="#">Zoom</a>)</li> <li>○ Telephone calls and email</li> <li>○ Collaborative platforms (Google, <a href="#">Padlet</a>, <a href="#">Flipgrid</a>, Discussion Board, etc.)</li> <li>○ Shared Google documents of common questions and teacher responses</li> <li>○ <a href="#">Desmos</a> self-checking activities</li> <li>● Answer keys and worked out solutions</li> <li>● Support continuous skill-building opportunities through online sites such as <a href="#">Khan Academy</a> or other resources</li> </ul>	<ul style="list-style-type: none"> <li>○ Textbooks - online or hard copies</li> <li>○ Vendor resources - online or paper</li> <li>○ <a href="#">Desmos</a> activities - online</li> <li>● Students attend office hours to receive content clarification, feedback, and support</li> </ul> <p><b>Thursday:</b></p> <ul style="list-style-type: none"> <li>● Students and teacher collaboratively discuss the completed tasks and compare problem-solving strategies and representations, justify thinking, and identify common errors and misconceptions</li> <li>● Students complete a <a href="#">learning log</a> to reflect on learning and identify additional support needed</li> </ul> <p><b>Friday:</b></p> <ul style="list-style-type: none"> <li>● Students complete a formative assessment to demonstrate learning</li> <li>● **Throughout the week students should participate in continuous skill-building. These are opportunities for students to practice skills that continue to develop fluency and make connections to new content.</li> </ul>
<p><b>RESOURCES</b></p> <ul style="list-style-type: none"> <li>● <a href="#">6-8 Online Resources</a> – Oregon Open Learning</li> <li>● <a href="#">9-12 Online Resources</a> – Oregon Open Learning</li> <li>● <a href="#">Oregon Open Learning</a> - additional resources</li> <li>● <a href="#">VDOE Rich Mathematical Tasks</a> - collection of tasks that teachers may choose to use with students.</li> <li>● <a href="#">Robert Kaplinsky</a> - includes a variety of <a href="#">lesson ideas</a>, <a href="#">problem-based resources</a>, and links to <a href="#">Open Middle</a> math problems</li> <li>● <a href="#">Illustrative Mathematics</a>- problem-based core curricula and professional learning resources that help teachers and students excel in teaching and learning mathematics</li> </ul>	